They stated that the collections would be of great value to School Boards, managers, and teachers, and they estimated 7000 square feet of surface as necessary, not including any allowance for the library.

Mechanical Collections

21. The Committee appointed to consider these collections were Mr. John Slagg, M.P., Sir W. G. Armstrong, Sir J. W. Bazalgette, Mr. James Brunlees, Mr. E. A. Cowper, Prof. T. M. Goodeve, Sir Charles Hutton Gregory, Mr. John Hick, Mr. James Howard, M.P., Mr. Charles Manby, Mr. J. Hinde Palmer, Sir E. J. Reed, M.P., and Mr. (now Sir) B. Samuelson, M.P.

They carefully examined the collections, including the "Patent Museum" (which, under the Patent Act, 1883, had been transferred to the care of this Department on January 1, 1884), and made a comprehensive report, embodying suggestions for the improvement and the arrangement of the whole.

They estimated that from 40,000 to 50,000 square feet of space would be required.

22. Considering that the members of these Committees were selected, on the responsibility of the Government, for their competence as authorities in their respective branches of science, and considering the detailed nature of their inquiries, we assume their conclusions as the basis of our recommendations.

We may also add that similar Committees are permanently retained, under the name of "Committees of Advice and Reference" for the several collections.

23. We need not enlarge on the desirability that such a country as Great Britain should possess a thoroughly good and complete National Collection of Scientific and Technical objects, any more than that it should possess a Museum of objects of Art or of Natural History.

When it is considered how much the prosperity of the nation is bound up with industrial enterprises and occupations, and how largely these depend, for their success, on practical applications of science, it needs no elaborate reasoning to prove that the public exhibition of well-selected and judiciously arranged scientific and technical collections, particularly when used in connection with efficient courses of instruction, justifies its cost.

24. There has long been a National Scientific and Technical Museum in France, well known under the name of the Conservatoire des Arts et Métiers, and this has often been referred to as a type of the institution of a similar nature which ought to be established in England.

We reprint, in Appendix C, an article published in the *Times* newspaper of October 5, 1876, which gives a full account of the nature and scope of the Conservatoire, and we have also received, through the courtesy of the Directors, full information as to the present contents and arrangements of the Museum.

The premises are situated in an area contained between the four streets, Rue St. Martin, Rue Vaucanson, Rue du Vert Bois, and Rue Réaumur. This area is about 200 metres wide by 140 metres deep, thus containing 28,000 square metres, or about 7 acres. These 7 acres are not at present entirely occupied by the Conservatoire, but an enlargement of the buildings is in progress, which will extend them, including the necessary courtyards, passages, &c., over the whole area.

The objects exhibited belong to a great variety of subjects, the following being only a brief indication of their general classification:—

Motors.—Horse-machines, water-motors, wind-motors, steam-engines, hot-air engines. Details and accessories.

Hydraulic Machines.—Pumps, &c.

Descriptive Geometry.—Forms of curves; teeth of wheels. Machines for producing special forms.

Metallurgy.—Working of mines. Minerals. Metallurgical processes. Metals.

Calculating and Counting Machines.

Instruments for Surveying.

Astronomy, &c.—Almanacs and Calendars.

Chronometry, ancient and modern; movements; tools.

Arts of Construction.—Materials, processes, workmen's tools, &c. Constructions under water.

Kinematics.—Machinery. Mechanism. Elements of machines.

Dynamometers and instruments for mechanical observations.

Cranes and other constructions for lifting and removing weights.

Machine Tools of various kinds. Presses, &c.

Engraving, Lithography, Typography, Printing, &c., and paper-making.

Porcelain, Glass, and Pottery.

Physics.—Mechanics. Molecular actions. Heat. Magnetism. Electricity. Acoustics. Optics. Meteorology. Electro-chemistry. Telegraphy.

Agriculture.—Apparatus of all kinds.

Weights and Measures.—French and foreign. Weighing-machines. Instruments of comparison.

Locomotion and Transport on ordinary roads, on railways, and on rivers, canals, and the sea.

Manufactures, various.—Gunpowder. Arms. Chemicals. Bread. Sugar. Cements. Cutlery. India-rubber.

Spinning and Weaving.—Textile manufactures generally.

Preparation, Dyeing, and Printing of Fabrics.

Chemical Arts and Products.—Preservation of Timber. Gas. Distilling. Brewing. Tanning, &c.

Industrial and Fine Arts.—Prints; designs. Photography.

Pictures and Drawings, illustrative of Scientific and Technical matters; a very large collection.

There are in all about 10,000 objects. The collection is remarkably rich, both in historic apparatus and in the most recent inventions. The machinery is shown in motion two days in the week. The objects are used, when required, for the lectures given in the Conservatoire.

Nothing is added unless it can be utilised for teaching; sometimes orders are given for models to be made, and sometimes objects are purchased. When anything is offered as a gift, it is not accepted unless one of the professors will state that it is really required.

The collection is not in any way a Patent Museum. Formerly certain models of patented inventions were exhibited there, but this is no longer done.

(*To be continued.*)

NOTES

THE meetings held yesterday at St. James's Palace and the Mansion House, to which we have not time to refer at length this week, indicate that from the Prince of Wales downwards all interested in the proposed memorial are willing to allow the necessity of making the Institute one on a broad scientific basis. An admirable speech by Prof. Huxley at the Mansion House, following that of the Prince of Wales at the first meeting, shows that there is now no chance of the importance and of the necessity of collecting and arranging *knowledge* being overlooked.

FRENCH geologists have cause to regret the blow which their science has received in the premature death of the well-known geologist of Lyons, C. F. Fontannes, on December 29, at the age of forty-eight. He is best known by his important monograph on the "Stratigraphy and Palæontology of the Tertiary Deposits of the Basin of the Rhone"—a work of laborious research and of great value from the minuteness and accuracy of its details. He established a claim on the gratitude of geologists by the infinite pains he took in the organisation and working of the International Geological Congress, the success of which has been in large measure due to his active help. His pleasant smile and cheery way of smoothing over personal friction will long be remembered by those who witnessed them at the meetings of the Congress.

Sir Francis Bolton died at Bournemouth on Wednesday, the 5th inst. He was born in 1831, and entered the army at the age of twenty-six. For some time he served on the staff as Deputy-Assistant Quartermaster-General, and in 1881 he retired with the rank of colonel. He was the inventor of the system of telegraphic and visual signalling which was introduced into the army and navy in 1863, and for these services and other improvements and inventions in regard to warlike material he received in 1883 the honour of knighthood. In 1870 he founded the Society of Telegraph-Engineers and Electricians.

Last year some of the leading statisticians of Europe combined to form a new Society, the International Statistical Institute. If we may judge from its aims, as set forth in the first article of its statutes, the Institute is likely to do work which will be of the highest service to Governments. It proposes to foster the progress of administrative and scientific statistics: "(1) by introducing as much as possible uniformity of method and classification and of handling statistical material, in order to make the results obtained in different countries comparable; (2) by calling the attention of Governments to those questions which require to be solved by statistical observation, and requesting from them information on subjects which have not yet been treated statistically, or have been only insufficiently treated; (3) by creating international publications intended to establish permanent relations among statisticians of all countries; (4) by striving, through its publications, and, if possible, by public instruction and other means, to promote the spread of sound ideas as to statistics, and to interest Governments and peoples in the investigation of the phenomena of society." The Institute intended to have held its first general meeting in Rome in September last, but was compelled by the spread of cholera in Italy to abandon its design. It has now decided to hold its first meeting in Rome in Easter week of this year, from April 12 to 16. Nearly fifty members have expressed their intention of being present, and it is expected that the attendance will be considerably larger. The Italian Government deserves the greatest credit for the generous and enlightened manner in which it is supporting the Institute. It allows Prof. Boris, the Director-General of the Statistics of the Kingdom of Italy, to act as Secretary, and in this capacity to use the services of his official staff. With the sanction of the Italian Parliament, it has granted a sum equal to 600*l.* to aid the Institute in printing its publications, and another sum of 400*l.* has been contributed to the expenses of the approaching meeting. Moreover, it has been arranged that for the benefit of members who attend the meeting the fares on the public railways to and from Rome shall be reduced by one-half. Signor Grimaldi, the Italian Minister of Commerce, is trying to induce other Governments to act in a similar spirit, and it may be hoped that his efforts will not be wholly unsuccessful.

On Saturday evening last, Sir John Lubbock delivered, at Toynbee Hall, a lecture on "Savages," the first of a new course. He pointed out that modern savages do not in all respects reproduce the condition of our ancestors in early times. Even the Australians hold now a system of complex rules and stringent customs, which have grown up gradually, and cannot have existed originally. From the study of modern savages, however, we may gain a fairly correct idea of man as he existed in ancient times, and of the stages through which our civilisation has been evolved. The lecturer gave a remarkably vivid and interesting account of some of the leading facts known about the customs, beliefs, and institutions of savage races.

On Friday evening last the Drapers' Company set an admirable example to other City Companies by entertaining at its Hall in Throgmorton Street the students associated with the Whitechapel centres of the University Extension Scheme. The classes connected with this Scheme at Toynbee Hall are attended by no fewer than 631 students, who receive instruction in physiology, astronomy, history, and English literature. The fee for a course of twelve lectures is one shilling.

The presidential address delivered at the annual meeting of the American Neurological Association in June last by Dr. Burt G. Wilder has been reprinted from the *Journal of Nervous and Mental Disease*. In this address Dr. Wilder discusses the question as to the need of some improvement in the nomenclature of the brain. He is convinced that the current nomenclature is to a large extent an obstacle rather than an aid to the advancement and dissemination of knowledge concerning a complex organ; and, with regard to the encephalic cavities in particular, he holds that it would be better for the student if the incongruous and misleading *quasi*-descriptive terms, *first*, *second*, *third*, *fourth*, and *fifth ventricle*, could be displaced by totally meaningless, but easily remembered, Chinese monosyllables, like *pran*, *pren*, *prin*, *pron*, and *prun*. Dr. Wilder has obtained an alphabetical list of nearly all the names which have been applied to the parts of the central nervous system, and, allowing for some omissions and duplicates, the numbers are as follows:—Latin, 2600; English, 1300; German, 2400; French, 1800; Italian and Spanish, 900; total, 9000. The number of parts designated by these names is considerably less than 500.

Referring to the death of Sir W. W. Heughes, which took place near London on New Year's Day, the *Colonies and India* mentions that practically he initiated the Adelaide University by contributing 20,000*l.* in 1872 for the endowment of two professorships. He also contributed largely to the expedition under Colonel Warburton for the exploration of the interior of the Australian continent. He received the honour of knighthood in 1880.

M. Janssen, the Director of the Meudon Observatory, who has been nominated Vice-President of the Paris Academy of Sciences for 1887, will be President in 1888, according to the constant rule.

It is said that M. Chevreul will resign his membership of the Academy of Sciences, and will return to his native place to spend the last years of his life in retirement. He has already sent in his resignation of the Directorship of the Museum.

One of the last letters written by M. Paul Bert was read at the meeting of the French Academy of Sciences on the 3rd inst. In this letter M. Bert complained of the darkness in the town of Hanoï at night. Gas was too dear, and he had tried the use of petroleum. This, however, was a barbarous expedient, and he was anxious to know whether it would not be possible for him to make the Red River, which flows past Hanoï, produce the required illumination. "Would the expense be great?" he wrote. "Only think, if we succeeded we should be ahead of England and Japan!" "Answer," he added, "and answer quickly; my days are numbered." The Academy decided that the letter should be preserved among its archives.

A large number of French scientific Societies are anxious that a building should be erected in Paris for their common use. A circular on the subject has been issued. The lead in the matter is being taken by the Geographical Society.

A good deal of canvassing has been going on recently in Paris, in the Sorbonne, the Medical School, and the Academy of Sciences, for professorships and seats in the Institute of France. Many superannuated professors have been removed, in consequence of the enforcement of a recent law; others have died. In the Medical School, Prof. Sappey's place has been given to M. Farabeuf, a distinguished anatomist, although entirely devoid of philosophical tendencies. Prof. Gavarret, whose well-known researches, conducted many years ago with Audral, have been of the utmost importance for the physiology of respiration, has seen his place filled by M. Gariel, who has been his assistant for a long time. Prof. Peter has taken the place of M. Hardy, in the Professorship of Clinical Medicine. He is an obstinate opponent of M. Pasteur's theories, but, nevertheless, a good physician, well trained, and skilled in his part of science. Prof. Pagot, the well-known Professor of Obstetrics, resigned his appointment on the day of his seventieth anniversary, and it is likely that M. Pinard will be his successor. M. Pinard is an able obstetrician, a good teacher, an original worker, and is much liked by students and professors. The vacancy caused at the Sorbonne by the death of Milne-Edwards has been filled by the appointment of M. Yves Delage, who has been for a short time Professor of Zoology in Caen. M. Yves Delage, although a very young man, has done a good deal of excellent personal work. His principal investigations bear upon the circulatory system of Crustacea, the life-history and anatomy of Sacculina, a parasitic Crustacean, and the anatomy of the whale. In the Academy of Sciences, M. Sappey was elected soon after his removal from the Medical School. His personal work has been good, and bears upon human anatomy, upon the anatomy of the lymphatic vessels, of the air-reservoirs of birds, and many other points of comparative anatomy. M. Ranvier, the able histologist of the Collège de France, will very likely be elected to the seat of Ch. Robin. One of the competitors for Paul Bert's seat is M. Ch. Rochet, the physiologist, and editor of the *Revue Scientifique*.

A VERY good little guide to the most picturesque streets and buildings in the capital of Egypt, by Major E. T. Plunkett, R.E., has just been published. It is entitled "Walks in Cairo." Major Plunkett's object is to call attention to "sights" which have hitherto been neglected by the writers of guide-books,—out-of-the-way mosques, in which the most graceful Arabesque forms may be found, with choice bits of marble mosaic and fine specimens of cabinet-work, and street corners made picturesque by minarets, overhanging stories, and windows of lace-like lattice-work. If any visitor is in doubt whether he would or would not enjoy the "Walks" described, he is advised to try one of them, and if he finds that uninteresting to try no more.

ON July 28 last, Miss Eleanor A. Ormerod, F.E.S., Consulting Entomologist to the Royal Agricultural Society, received from Revell's Hall, Hertford, specimens of injured barley, which on examination precisely corresponded with the condition caused by attack of the *Cecidomyia destructor*, commonly known as the Hessian fly. A paper setting forth the results of her observations, with the opinions of high authorities in England and America, was read at the Entomological Society of London on December 1 last. An abstract of this paper will be found in the *Entomologist* for January.

IN the January *Zoologist* there is a very good representation of the Greater Horse-shoe Bat (*Rhinolophus ferrum-equinum*). It illustrates an article on "Horse-shoe Bats" by the editor, who remarks that as few really good figures of bats are accessible, those in Bell's work being almost too small to be of much use, it is very desirable that no opportunity should be lost of obtaining correct drawings of the rarer species whenever they can be procured alive or in a fresh condition, so as to secure an accurate delineation of the natural features before they become distorted or shrunk in the process of drying. The plate which he offers as a first contribution to such a series is from a living specimen obtained by the Rev. H. A. Macpherson in South Devon in August last. This specimen weighed little more than half an ounce the day after death.

SEVERAL Arctic species of birds, which do not breed in England or Ireland, breed in Scotland. This fact is explained by Mr. Henry Seebohm in an article in the January *Zoologist*. Most, if not all, of the species in question breed in July, and, roughly speaking, they draw the line a few degrees below 60° F. They do not breed in any locality where the mean temperature for July is as high as 60°, the reason probably having relation to the supply of food. Now, in a map of the world, in Keith Johnston's "Physical Atlas," giving the mean temperature for July in various parts of the earth, the isothermal line of 59° is drawn. This line separates England and Ireland from Scotland, passes north of the Gulf of Bothnia, through the town of Archangel, extends nearly straight across Russia and Western Siberia, but, east of the valley of the Yenesei, again rises until it almost reaches the coast near the delta of the Lena. Farther east in Siberia it plunges south again, much more rapidly than it rose in Western Europe, and, passing south of Kamchatka, it embraces the Kurile Islands in the latitude of the Pyrenees. This line is almost exactly parallel with what is known of the southern breeding-ranges of the various Arctic birds under consideration. It is not, therefore, surprising that these birds should breed in Scotland; and there is no reason, Mr. Seebohm concludes, for attempting to explain by any other causes than the ascertained climatic cause, the interesting fact that British ornithologists are able to study the breeding habits of so many species which their Continental fellow-students can only observe by travelling 500 miles or more farther north.

THE Journal of the Society of Arts prints an interesting letter from Mr. T. F. Peppe, on the cultivation of the so-called wild silks of India. Mr. Peppe points out that in many parts of India the jungle consists of the plants on which the tussur worm feeds, and that the supply of labour is practically unlimited. At present the work is carried on only by a few tribes who have been accustomed to it from time immemorial; but nearly all the aboriginal tribes of India might be available, if their services were in demand. The chief obstacle to the rapid development of the industry is the difficulty of procuring seed-cocoons, which have to be sought for in the wild state in the jungles. This difficulty, however, Mr. Peppe thinks, will be gradually overcome, since in every cultivated tract there are always a few cocoons which escape detection and collection, and which add to the number of wild cocoons found in the next brood. The industry is precarious, but there are several crops in the season, and if one fails the others may succeed. Mr. Peppe has cultivated tussur for three years, yet he is not prepared to say how many broods are possible in a year. Each brood so overlaps the succeeding one, that it is very difficult to distinguish one brood from another.

A COURSE of five lectures on "Molecular Forces" will be delivered by Prof. A. W. Rücker, M.A., F.R.S., at the Royal Institution, beginning on Thursday, the 20th inst. The remaining lectures will be delivered on the 27th inst., and on February 3, 10, and 17.

MESSRS. W. WESLEY AND SON have issued the seventy-ninth number of their "Natural History and Scientific Book Circular." The most important part of the Catalogue appears under the heading "Ornithology."

WE have received the "Year-book of Photography and the Topographic News Almanac for 1887," edited by Mr. Thomas Bolas, F.C.S It contains, besides a calendar for the year and lists of photographic societies, a large number of notes and articles likely to be interesting and useful both to beginners in photography and to advanced practitioners.

THE Severn Fishery Board has issued an Almanac for the year 1887, which is intended to show the law as to fishing in the Severn fishery district, and to indicate to water-bailiffs, fishermen, and others interested in fishing, what they may look for in different months of the year. The information on which the statements in the Almanac are based was collected by the Board's officers.

THE seventh volume of the Transactions of the Sanitary Institute of Great Britain, 1885-86, presents a full report of the proceedings of the Congress of the Institute held at Leicester from September 22 to 26, 1885. The papers read at the Congress were divided into three sections—(1) Sanitary Science and Preventive Medicine; (2) Engineering and Architecture; (3) Chemistry, Meteorology, and Geology. Mr. John F. J. Sykes, Honorary Secretary for the first section, recommends that a special day, or part of a day, should be devoted to the consideration of domestic sanitation and ambulance. In both of these subjects ladies take great interest, and Mr. Sykes is of opinion that his suggestion, if adopted, would add immensely to the success of future Congresses.

THE amount of the rainfall at Ben Nevis Observatory during 1886 was 107·85 inches, the greatest monthly fall being 14·57 inches in November, and the least 2·84 inches in February. In 1885 the annual rainfall was (see vol. xxxiii. p. 347) 145·50 inches, the largest monthly fall being 24·33 inches, and the least 4·97 inches, the rainfall of 1886 being thus very much less.

WE understand that complaints have been made to the Fishery Board for Scotland that steam-vessels have been recently prosecuting beam-trawling overnight in the waters closed by the Board's by-law against this mode of fishing. Some time since the Board instituted legal proceedings against parties who had infringed the by-law, some of whom were fined, and they also posted placards at the different harbours and creeks in the prescribed waters giving notice of the terms of the by-law, and it was hoped that the illegal practice would have been thereafter discontinued. The Board's cruiser *Vigilant* has done what she could to protect these waters, but owing to her being a sailing-vessel she cannot do this so effectively as a vessel with steam power. In the circumstances the Board have instructed H.M.S. *Jackal*, at present cruising on the west coast, at once to proceed to the east coast and protect the inclosed areas there, as well as to take a general superintendence of the fisheries. The prescribed waters include the Firth of Forth, St. Andrews Bay, and Aberdeen Bay. The present *Jackal* is a new, powerful, and swift vessel, and is provided with the electric light, which will enable her to sight vessels at a considerable distance on dark nights. The Board's cruiser *Vigilant* will at once proceed to the west coast and take up fishery duty there, assisted by H.M.C. *Daisy* tender.

THE Report of the Swiss Commission for the Reform of Gymnasial Instruction has just been issued. The Commission recommend that the teaching of Latin shall begin in the fifth class, and shall be continued, for five hours weekly, up to the highest class; that instruction in Greek shall depend upon the expressed desire of parents or guardians, and shall begin in the fourth class; and that all scholars who do not learn Greek shall learn either English or Italian. Two spare hours gained by pupils in English or Italian are to be spent in the study of natural science and mathematics.

MR. EDISON, the electrician, of New York, is reported to be seriously ill.

THE additions to the Zoological Society's Gardens during the past week include two Barn Owls (*Strix flammea*) from South Africa, presented by Mr. E. Hume; a Black-headed Gull (*Larus ridibundus*), British, presented by Mr. W. S. Rawlinson; two Eyed Lizards (*Lacerta ocellata*), European, deposited; four Bramblings (*Fringilla montifringilla*), British, purchased.

OUR ASTRONOMICAL COLUMN

THE SIX INNER SATELLITES OF SATURN.—Appendix I. to the volume of Washington Observations for 1883 contains an important memoir by Prof. Asaph Hall on the orbits of the six inner satellites of Saturn. Of these, the two innermost have been known to us about 100 years, but the other four for more than 200. Owing, however, to the difficulty of making accurate observations of them, their orbits were but rough approximations until the publication of Bessel's work on the orbit of Titan, which appeared in vols. ix. and xi. of the *Astronomische Nachrichten*, and from which that value of the mass of Saturn was derived which has been generally used up to the present time in computing the perturbations produced by this planet. Bessel likewise commenced, but did not live to complete, a memoir on the "Theorie des Saturns Systems," of which Prof. Hall justly remarks that it "is still the most comprehensive investigation we have of the differential equations of this system, and of the various forms of the perturbative function arising from the figure of the planet, the ring, the action of the satellites on each other, and the action of the sun." M. Tisserand has shown, however, in a short but important paper, "Sur le mouvement des absides des satellites de Saturne et sur la détermination de la masse de l'anneau," that Bessel's determination of the mass of the ring from the motion of the line of apsides of the orbit of Titan was seriously in error, since he neglected the influence of the figure of the planet. We were, therefore, ignorant of the true value of the mass of the ring, but if the inner satellites moved in orbits which were decidedly eccentric, so that the motions of the lines of apsides could be accurately determined, the mass of the ring and figure of the planet could be deduced. It was therefore a matter of great interest to determine these orbits as accurately as possible; and Prof. Hall therefore undertook the observation of those satellites with the great refractor of the Naval Observatory, Washington. The observations of Titan, given in Prof. Hall's paper, were made at Washington during the eleven years, 1874 (in which year Prof. Newcomb observed the satellite) to 1884. During the years 1875, 1876, and 1877, Prof. Hall observed differences of R.A. and declination of Saturn and Titan at the same time and in the same manner as he observed Iapetus, to which satellite he found the method well adapted. Rhea, Dione, and Tethys were observed by Prof. Newcomb in 1874 and by Prof. Hall in 1875, whilst for Mimas and Enceladus observations extending over the years from 1874 to 1879 have been used. In the reduction of the observations of Rhea, Dione, and Tethys, the observed places have been compared with places computed from the elements for these satellites given by Dr. W. Meyer, of Geneva, and corrections to his elements are deduced therefrom. The corrected orbits show in each case a practically insensible eccentricity, and the observations of Mimas and Enceladus also can be satisfied within the limits of their probable errors by circular elements. Prof. Hall, however, draws attention to the fact that for the three innermost satellites the eccentricity of the orbit, and consequently the position of the line of apsides, cannot be determined with any certainty from the observations at his disposal. Some more accurate method of observation than that of the filar micrometer should be adopted; possibly observing the conjunctions of the satellites with the ends of the ring, the Cassinian division, and with the sides of the ball, might prove more efficient. A heliometer, if one existed of sufficient aperture, would probably furnish the most satisfactory means of all.

The orbits of the five inner satellites being thus sensibly circular, any consideration of the motions of their lines of apsides is placed out of the question. These five satellites also appear to move in the plane of the ring. It is therefore easy to furnish tables of their motions, and Prof. Hall supplies them for the period 1875-1950, together with the elements of the ring, at the close of his paper. For the mass of Saturn, from the motions of Titan, Rhea, Dione, and Tethys, he finds the reciprocal to be 3478·7 ± 1·10. The best previous determinations have been